ENT COOPERATION TREA

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

Date of mailing (day/month/year)

From the INTERNATIONAL BUREAU

Commissioner **US Department of Commerce United States Patent and Trademark** Office, PCT 2011 South Clark Place Room

CP2/5C24

Arlington, VA 22202 **ETATS-UNIS D'AMERIQUE**

11 June 2001 (11.06.01)	in its capacity as elected Office
International application No. PCT/GB00/03534	Applicant's or agent's file reference NJE/G13772WO
International filing date (day/month/year)	Priority date (day/month/year)
14 September 2000 (14.09.00)	16 September 1999 (16.09.99)
Applicant	
BEARD, Paul et al	
in a notice effecting later election filed with the In 2. The election X was was not	nary Examining Authority on: 01 (06.04.01)
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The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland

Authorized officer

Olivia TEFY

Telephone No.: (41-22) 338.83.38

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WIPO	PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's	or agent's file reference		
NJE/G13	•	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
Internation	al application No.	International filing date (day/month	//year) Priority date (day/month/year)
PCT/GB	00/03534	14/09/2000	16/09/1999
G01N29	al Patent Classification (IPC) or /24	national classification and IPC	'
Applicant UNIVER	SITY COLLEGE LONDO	N et al.	
	nternational preliminary exa s transmitted to the applicar		by this International Preliminary Examining Authority
2. This l	REPORT consists of a total	of 7 sheets, including this cover sl	neet.
b	een amended and are the b		e description, claims and/or drawings which have ontaining rectifications made before this Authority ons under the PCT).
These	e annexes consist of a total	of sheets.	
3. This r	eport contains indications re	elating to the following items:	
1	Basis of the report		
11	☐ Priority		
	•	f opinion with regard to novelty, inv	entive step and industrial applicability
IV	☐ Lack of unity of inver		. , ,
٧	Reasoned statement citations and explana	under Article 35(2) with regard to a	novelty, inventive step or industrial applicability;
VI	☐ Certain documents of	cited	
VII	☐ Certain defects in the	international application	
VIII	☐ Certain observations	on the international application	
Date of sub	mission of the demand	Date of c	completion of this report
06/04/20	01	07.01.20	02
	mailing address of the internatio examining authority: European Patent Office		ed officer
)	D-80298 Munich Tel. +49 89 2399 - 0 Tx: 5236 Fax: +49 89 2399 - 4465	'	, W

Telephone No. +49 89 2399 2623

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03534

 Basis of the report 	. B	asis	of t	:he i	repo	rt
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the receiving Office			ments of the international application (Replacement sheets which have been furnished to response to an invitation under Article 14 are referred to in this report as "originally filed" o this report since they do not contain amendments (Rules 70.16 and 70.17)):
	1-1	2	as originally filed
	Cla	aims, No.:	
	1-1	9	as originally filed
	Dra	awings, sheets:	
	1/2	-2/2	as originally filed
2.			guage, all the elements marked above were available or furnished to this Authority in the international application was filed, unless otherwise indicated under this item.
	The	ese elements were a	available or furnished to this Authority in the following language: , which is:
		the language of a	translation furnished for the purposes of the international search (under Rule 23.1(b)).
		the language of pu	ublication of the international application (under Rule 48.3(b)).
		the language of a 55.2 and/or 55.3).	translation furnished for the purposes of international preliminary examination (under Rule
3.			eleotide and/or amino acid sequence disclosed in the international application, the y examination was carried out on the basis of the sequence listing:
		contained in the in	ternational application in written form.
		filed together with	the international application in computer readable form.
		furnished subsequ	ently to this Authority in written form.
		furnished subsequ	ently to this Authority in computer readable form.
			t the subsequently furnished written sequence listing does not go beyond the disclosure in pplication as filed has been furnished.
		The statement tha listing has been fu	t the information recorded in computer readable form is identical to the written sequence rnished.
4.	The	amendments have	resulted in the cancellation of:
		the description,	pages:
		the claims,	Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03534

		the drawings,	sheets:		
5. This report has been established as if (some of) the amendments had not been made, since they h considered to go beyond the disclosure as filed (Rule 70.2(c)):					
		(Any replacement sh report.)	eet contai	ining such	amendments must be referred to under item 1 and annexed to this
6.	Add	litional observations, it	necessa	ry:	
v	Ros	soned statement un	المناهات المالة	- 05(0)	
٧.		tions and explanatio			ith regard to novelty, inventive step or industrial applicability; ch statement
	cita				
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	cita Stat Nov	tions and explanatio	ns suppo Yes:	Claims Claims Claims Claims	ch statement
	Stat Nov Inve	tions and explanationement relty (N)	Yes: No: Yes: No:	Claims Claims Claims	16, 18

2. Citations and explanations see separate sheet

1. The following documents are referred to in this report:

D1=Applied Optics Vol. 35; Nr. 4; pages 663-675; 01 February 1996; Beard P C and T N Mills; "Extrinsic optical-fiber ultrasound sensor using a thin polymer film as a low-finesse Fabry-Perot interferometer".

D2=Electronics Letters Vol. 33; Nr. 9; pages 801-803; 24 April 1997; Beard P C and T N Mills; "Miniature optical fibre ultrasonic hydrophone using a Fabry-Perot polymer film interferometer".

D3=Ultrasonics Vol. 37; Nr. 1; pages 45-49, January 1999; Wilkens V and Koch Ch; "Fiber-optic multi layer hydrophone for ultrasonic measurement".

D4=Optics letters vol 24, no 15, pages 1026-1028; 01 August 1999; Wilkens V and Koch Ch; "Optical multi layer detection array for fast ultrasonic field mapping".

D6=US4360820

2. The present application relates to an optical sensor (in particular but not limited to examination of e.g. medical tissue) using an optical interrogation signal directed normally and extending over a thin film disposed over a substrate in the sensor head. Variations in the positions of the thin film surfaces acting as the mirrors of an interferometer cavity are detected by the interrogation signal. In the main embodiment of the mode of operation, optical pulses generate acoustic waves in the subject to be examined (e.g. medical tissue) which are representative of the composition of the subject (tissue).

3. **PRIOR ART**

D1 (Figs. 1, 5; pages 64, 669-670) discloses the use of polymers on fiber tips for opto-acoustic sensing using laser pulse excitation to generate thermo-elastic waves.

D2 (Fig. 1) discloses the use of a polymer film on a fibre tip for ultrasound detection.

D3 (Fig. 1) discloses the use of evaporated dielectric coatings on fiber tips for ultrasonic measurement as an improvement on polymer film tipped fibres.

D4 (Fig. 4) discloses a detection array for ultrasonic mapping using a glass plate coated with a dielectric multi layer system in which the whole detection array is illuminated with an interrogating collimated laser beam for parallel evaluation over the whole of the sensor head using e.g. a two dimensional CCD array.

D4 reference 2 is to D3, D3 reference 2 is to D2, D2 reference 5 is to D1 so that the skilled person reading D4 would be aware of the content of D1-D3.

CLAIMS 1-15 4.

4.1 NOVELTY (Art. 33.2 PCT)

D4 summarised above is considered to represent the closest prior art - this document discloses all features of the sensor of claim 1 except:

a) the use of a polymer film (as the interferometric enhancing structure).

Claim 1 and dependent claims 2-15 therefore meet the requirement of novelty.

4.2 INVENTIVE STEP (Art. 33. PCT)

Re a):

D1-D4 are numbered according to publication date - the overall teaching of this prior art vis a vis optical detection of ultrasonic signals is that initially fibre optic sensors using a thin polymer film as a low finesse Fabry Perot interferometer were developed (D1-D2). Subsequently the possibility of replacing the polymer on the fiber tip with a dielectric multi layer structure (D3, col 1) was suggested, and later

the "enlargement of the acoustic probe" by replacing the fiber arrangement with a glass plate (D4) was proposed.

The skilled person reading D4 would therefore clearly be aware of D3, and in particular the passage on page 45, col 1 headed "Introduction" which concisely summarises technology with which such persons are familiar. This passage clearly presents the use of polymer films and evaporated dielectric coatings as well-known alternative interferometric enhancing structures whose modus operandi is a deformation under the action of acoustic pressure waves leading to modification of the optical interference patterns. In the selection of either of these materials, the application (single point or two dimensional) is of no consequence in particular the "enlarged" two dimensional form of the sensor head in D4 does not restrict the form of the interferometer layer to dielectric coatings only.

In addition, the advantages of using multilayer dielectrics listed in D3 are both relative ("simple" manufacturing - spinning a polymer film is considerably less time consuming than using vacuum evaporation equipment), non-exclusive (pages 3-4 of the application lists advantages of using polymer films) and do not represent a prejudice towards skilled persons considering the use of polymers.

The skilled person reading D4 would therefore be familiar with using polymer films in place of dielectric films in these devices as the most obvious alternative interferometric enhancing structure. The selection according to feature a) would therefore not require any inventive activity on behalf of the skilled person.

Claim 1 therefore does not meet the requirement of inventive step.

Dependent claims 2-15 also do not meet the requirement of inventive step for the reasons indicated below:

Claims 2-3, 11-12. D4

Claims 4-6, 8-10. D1

Claim 7. D2 (Fig. 1).

Claim 13. Surface temperature measurement. D1 refers to the opto-acoustic excitation in terms of laser pulse generation of thermo elastic waves which indicates the dependence of the measurement on temperature and the requirement to monitor this parameter.

Claim 14. Optical arrangement for altering the angle of incidence of the interrogation signals. D4 (Fig. 4) illustrates the use of a beam splitter BS for redirecting the interrogating laser beam to the sensor head. The requirement of normal incidence of the beam would most easily be implemented by rotating the BS.

Dependent claims 2-15 also do not meet the requirement of inventive step (Art. 33.3 PCT).

Claim 15. Neither D4 nor any of the remaining cited documents suggest selection of different angles of incidence for different location of the sensor head - the wording of claim 15 should be modified to comprise this feature as a apparatus component rather than a method step.

CLAIMS 16-19 5.

The reference to the interferometer in these method claims is not considered to limit the subject-matter of the method any further than the steps following the wording "comprising" since the steps in manufacturing are not specified by reference to the finished product.

D6 (Fig.2; cols 5-6) is an example of the known techniques for forming polymer films on transparent substrates by e.g. spin coating and thermal evaporation of e.g. parlyene and curing by ultraviolet light. D6 does not specifically disclose curing of thermally evaporated films or electrons beam curing but these are wellknown in the art.

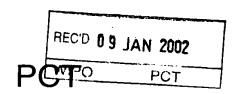
In view of D6 claims 16, 18 do not meet the requirement of novelty (Art. 33.2 PCT) and claims 17, 19 do not meet the requirement of inventive step (Art. 33.3 PCT).

PATENT COOPERATION TREATY

From the INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

The International Bureau of WIPO 34, chemin des Colombettes CH - 1211 Geneva 20 Switzerland



NOTIFICATION CONCERNING DOCUMENTS TRANSMITTED

Date of mailing 07.01.2002 (day/month/year) International application No: PCT/GB00/03534 This International Preliminary Examining Authority transmits herewith the following documents: 1. demand (Rule 61.1(a)). 2. copy of the international preliminary examination report and its annexes (Rule 71.1). 3. ____ other documents (specify):

Authorized officer

Tel. +49 89 2399-2382

Weber, R

Form PCT/IPEA/415 (January 1995)

Name und mailing address of the IPEA/

D-80298 Munich

European Patent Office

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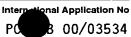


PCT PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference NJE/G13772W0		of Transmittal of International Search Report 220) as well as, where applicable, item 5 below.
International application No.	International filing date (day/month/year)	(Earliest) Priority Date (day/month/year)
PCT/GB 00/03534	14/09/2000	16/09/1999
Applicant UNIVERSITY COLLEGE LONDO	N .	
	een prepared by this International Searching Aut transmitted to the International Bureau.	hority and is transmitted to the applicant
This International Search Report consis	sts of a total of4 sheets. by a copy of each prior art document cited in this	s report.
	ne international search was carried out on the ba unless otherwise indicated under this item.	isis of the international application in the
the international search Authority (Rule 23.1(b)	n was carried out on the basis of a translation of	the international application furnished to this
was carried out on the basis of contained in the interna	and/or amino acid sequence disclosed in the inthe sequence listing: ational application in written form. International application in computer readable for	
furnished subsequently	to this Authority in written form.	
furnished subsequently	to this Authority in computer readble form.	
	subsequently furnished written sequence listing on as filed has been furnished.	does not go beyond the disclosure in the
the statement that the i furnished	nformation recorded in computer readable form	is identical to the written sequence listing has been
	ound unsearchable (See Box I).	
3. Unity of invention is I	acking (see Box 11).	•
4. With regard to the title,		
X the text is approved as	submitted by the applicant.	
the text has been estate	olished by this Authority to read as follows:	
5. With regard to the abstract,		
X the text is approved as	submitted by the applicant.	
	olished, according to Rule 38.2(b), by this Author the date of mailing of this international search re	
	ublished with the abstract is Figure No.	1
as suggested by the ap		None of the figures.
	failed to suggest a figure.	
because this figure bet	ter characterizes the invention.	



		PC	8 00/03534
A. CLASSI IPC 7	FICATION OF SUBJECT MATTER G01N29/24 G01H9/00		=
According to	o International Patent Classification (IPC) or to both national classifi	cation and IPC	
B. FIELDS	SEARCHED		
Minimum do IPC 7	ocumentation searched (classification system followed by classification ${\tt G01N}$	tion symbols)	
Documenta	tion searched other than minimum documentation to the extent that	such documents are included in t	the fields searched
Electronic d	ata base consulted during the international search (name of data b	ase and, where practical, search	terms used)
EPO-In	ternal, INSPEC, COMPENDEX		
C. DOCUM	ENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the re	elevant passages	Relevant to claim No.
A	BEARD P C ET AL: "EXTRINSIC OPT ULTRASOUND SENSOR USING A THIN P FILMAS A LOW-FINESSE FABRY-PEROT INTERFEROMETER" APPLIED OPTICS,US,OPTICAL SOCIET AMERICA,WASHINGTON, vol. 35, no. 4, 1 February 1996 (1996-02-01), pa 663-675, XP000630302 ISSN: 0003-6935 page 664; figures 1,5 page 669 -page 670	OLYMER Y OF	1-15
	her documents are listed in the continuation of box C.	Patent family member	s are listed in annex.
A docume consider a docume which citation of docume other a docume of the results of the resul	ent defining the general state of the art which is not dered to be of particular relevance document but published on or after the international date ent which may throw doubts on priority claim(s) or is cited to establish the publication date of another n or other special reason (as specified) ent referring to an oral disclosure, use, exhibition or means ent published prior to the international filing date but han the priority date claimed	cited to understand the princention "X" document of particular relevannot be considered now involve an inventive step w "Y" document of particular relevannot be considered to in document is combined will	conflict with the application but notice or theory underlying the vance; the claimed invention el or cannot be considered to when the document is taken alone vance; the claimed invention tool to be inventive an inventive step when the hone or more other such docupation of the control of the
Date of the	actual completion of the international search	Date of mailing of the inten	national search report
1	2 January 2001	27/02/2001	

Form PCT/ISA/210 (second sheet) (July 1992)

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Name and mailing address of the ISA

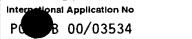
12 January 2001

European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016

Authorized officer

Mason, W





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Relevant to claim No.
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Category °	cition) DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages	 Relevant to claim No.
A	WO 93 01476 A (MASSACHUSETTS INST TECHNOLOGY) 21 January 1993 (1993-01-21) page 12 -page 17; claim 1; figures 2,3	1-15

Information on patent family members

Internal Application No	
PGB 00/03534	

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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